Lumbar Disorders: Evaluation and Surgical Indications

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Nothing to disclose
Overview

- Example Case
- Lumbar pathology
  - Incidence/Prevalence
  - Etiologies
- Treatment strategies
  - Examination
- Surgical patients
EXAMPLE CASE
Case Presentation

- 23 year old UK student
- Full-time student
- Works part-time as salesman
- Healthy, nonsmoker
Case Presentation

- No precipitating event
- Sudden onset low back pain, R leg pain
  - Numbness, same distribution as pain
  - Worsens with transfer from sitting to standing
  - Ameliorated by frequently changing positions
- Hasn’t missed any school or work from this
Case Presentation: Series of Events

- Saw primary care physician within one week of onset of pain
- MRI ordered
- Patient sent to/seen in Neurosurgery Clinic within two weeks of onset of symptoms
Presenting Examination - Pertinents

- Pleasant young man, athletic build
- Nontender to palpation
- Antalgic gait but able to toe/heel/tandem
- Intact strength in legs
- Decreased sensation right foot, laterally
- Absent right Achilles
- Positive straight leg response on right
MRI

L5-S1 HNP
~Central

Foramen patent
Presenting Information: Diagnosis

- Low back pain with right S1 radiculopathy
  - Pain
  - Numbness
  - Hyporeflexic
  - No weakness
  - No loss bowel/bladder function
- L5-S1 Disk Herniation confirmed on MRI
- *History, clinical exam, radiology=concordant*
Presenting Exam: Recommendations

- Conservative measures x 4-6 weeks
  - Self-directed spinal conditioning
  - NSAIDs
  - Physical therapy
- Return to clinic in ~6 weeks
  - Sooner if any worsening
What is the standard of care for low back pain/leg pain?
Lumbar Disease: Snapshot of the United States

**Low Back Pain**
- Incidence (lifetime) 60-90%
- Incidence (annual) 5%
- 14% of new patient visits, annually, 15% sick leave
- #1 cause of disability in <45yr olds
- At any given time, 2.4 million Americans are disabled because of LBP

**Lumbar Radiculopathy**
- Incidence (annual) 3-5%
- Males and females affected equally
- Of those with radiculopathy, 20% have symptoms persisting >6 weeks
Assessment of the Patient with Lumbar Disease
Assessment of Back Pain: 

**History**

- Age
- Duration of symptoms
- Location of symptoms
  - Pain, numbness, weakness
- Acuity of symptoms
  - Progressive or static
  - Improvement
- Significant trauma
- Bowel/bladder function
- Work status, pending litigation, disability issues
- Other psychosocial factors affecting “pain” experience
  - Depression, dementia, perceived QOL

*Overall disease burden, loss of compensatory ability (physical & emotional)*
Assessment of Back Pain: Clinical Exam

- Motor
- Sensory
- Reflexes

- Palpation to determine any focality
- ROM to determine joint involvement
  - Hip, SI, knee, ankle
Assessment of Back Pain: Physical Exam Findings

Agency for Health Care Policy & Research, 1994

Three Categories

- Potentially Serious Spinal Condition (Tumor, Infection, Fracture, Cauda Equina)
- Sciatica (Radiculopathies)
- Nonspecific Back Symptoms
Assessment of Back Pain: Management

Rule out red flags
  - If present, work up expeditiously

Rule out rapidly progressive loss of neurologic function (objective)

In the absence of the above, 4-6 weeks of conservative care is indicated prior to pursuing further diagnostic workup

Agency for Health Care Policy & Research, 1994
ETIOLOGIES:
First Category: Red Flags

- Tumor
- Infection
- Fracture
  - Traumatic
  - Osteoporotic/Metabolic
  - Pathologic
- Cauda Equina
ETIOLOGIES:
Second Category: Radiculopathy

Extremity Symptoms *Plus* Axial Pain *OR* Extremity Symptoms WITHOUT axial pain

Concern: Spine problem with neural compromise
*localize neural involvement*

- Nerve root
  - Radiculopathy
  - Neurogenic claudication
- Cord/Conus
  - Myelopathy
  - Cauda equina – *an emergency*

- *N.B.: Peripheral Neuropathies*
  - Metabolic (diabetes, etc.)
  - Compressive (carpal tunnel, etc.)
  - Genetic/syndromic
Second Category: Radiculopathy

Neural Compression

Findings

- Nerve root(s)
  - **Radiculopathy** = Dysfunction of a nerve root
  - Subjective: Pain, numbness, tingling, weakness
    - Dermatomal sensory disturbances
      - Sharp, stabbing pain, well-defined
    - Myotomal sensory disturbances
      - Deep, aching, dull
  - Objective: LMNs
    - Sensory disturbance in the distribution of the nerve
    - Weakness of muscles innervated by that nerve root
    - Hypoactive muscle stretch reflex
    - Fasciculations
Second Category: Radiculopathy

Neural Compression

Findings

- **Nerve root(s)**
  - **Neurogenic Claudication**
    - compression with activity (stenosis)
    - Subjective: symptoms associated with walking
      - Low back pain
      - Ill-defined pain in legs, calves
      - Frequently with paresthesias
      - Need to take frequent breaks to rest legs
      - “Shopping cart” sign
  - Objective:
    - Usually neurologically intact on exam
    - Good distal pulses (to rule out vascular etiology)
  - **Cauda equina** (emergency, i.e., <24h)
    - L4-5*
Second Category: Radiculopathy

Neural Compression

Findings

- **Spinal cord**
  - **Myelopathy** = Dysfunction of the spinal cord
    - Subjective: Pain, numbness, tingling, weakness
      - Sensory disturbances = at & below a level
      - Myotomal sensory disturbances
        - Deep, aching, dull
    - Objective: UMN
      - Sensory disturbance at/below a level
      - Spastic weakness
      - Hyperactive muscle stretch reflex
ETIOLOGIES: Third Category: Back Pain

- Axial
- Paraspinal*
- Mechanical back pain
- Spinal Instability
Third Category: Back Pain

Axial Pain

General Etiologies

- **Congenital**: (scoliosis, spina bifida disorders, ankylosing spondylitis, Scheuermann’s)
- Neoplastic
- Infectious
- Acquired
  - Myofascial pain
    - Fibromyalgia
    - Piriformis syndrome
  - Arthritis (*"...the hip bone’s connected to the knee bone...*)
    - Spinal degenerative changes, aka Spondylosis
    - Sacro-iliitis
    - Hip osteoarthritis

*With or without neuropathy, radiculopathy, myelopathy*
Nociceptors in
- Joint capsules
- Ligaments and tendons
- Perivascular sites
- Periosteum
- Muscles ("Myofascial pain syndrome")
- Disk ("Diskogenic back pain")

aka “Then why does my back hurt?”
Third Category: Back Pain

Axial Pain

- Mechanical low back pain = Musculoskeletal
  - The most common
  - Etiology of onset identifiable in only ~20%
  - Strain, sprain of muscles, ligaments, joints, facet
  - Not surgically amenable

- Degenerative disk or joint changes = “Acquired”
  = Spondylosis (DDD/DJD)
  - ? Surgically amenable - controversial
    - Disk replacements
    - Facet replacements
    - Fusions
Spondylosis

Spondylolisthesis
(spondylolysis)
Assessment of Back Pain:

Radiographic Studies

- XRays
- Computed Tomography (CT)
  - With or without Myelography
- Magnetic Resonance Imaging (MRI)
Radiographic Studies:
Components of Surgical Concern

- Bone
- Joints
- Curves/Alignment
- Disks
- Central canal size
- Foraminal size
Treating the Patient with Lumbar Disease
Treatment Strategies

NONSURGICAL

SURGICAL
Treatment Strategies: Basics

- Once diagnosis is made, the next step is to engage the patient as an active participant in his/her care
  - Patient education
  - Motivational assessment
  - Realistic expectations of treatment options
  - Lifestyle changes
    - Home ergonomics
    - Modifying behaviors to decrease surgical risk/improve outcome
      - Smoking cessation
      - Control of diabetes
      - Weight loss, physical conditioning
        - Home or formal regimen
      - Drug withdrawal program (narcotics, alcohol)
    - Job alterations – vocational rehabilitation

*Poor outcomes more likely in poorly motivated patients, independent of type of treatment*
NONSURGICAL Treatment

Conservative Management

- ≠ “Not Aggressive”
- Subject to interpretation
- To most surgeons, means several weeks-months of aggressive nonoperative management

Interventions

- What can the patient do for himself/herself
- Treatment regimen guided by primary care provider

- Allows time to gauge patient motivation/expectation
NONSURGICAL Treatment

LBP:LEG symptom ratio

- The patient with overwhelming back pain and intact neurologic exam (without red flags) is unlikely surgical
  - LBP > LE sx
Treatment Options: Nonsurgical

“The Basics”

- **Home Regimen**
  - Ergonomics, posture
  - Heat/cold, massage
  - Cream/topicals
  - Exercise (stretching & strengthening)
    - ≠ “going to work” or “running after my kids”
    - Pool
    - Pilates, Tai Chi – spinal conditioning

- **Medications**
  - NSAIDs
  - TCAs, meds for fatigue/depression
  - Muscle relaxants
  - Narcotics-sparingly

- **Physical Therapy** – formalized, guided exercises, including
  - Modalities of heat, US, massage
  - ROM, extremity stretching & strengthening, core strengthening
  - Traction
  - Training with assistive devices
Treatment Options: Nonsurgical "The Basics PLUS"

Conservative Management: Procedures

- **Injections (Pain Management)**
  - Joint injections (SI, hip, facet)
  - Trigger point injections
  - LESI
  - SNRB (transforaminal)
  - Facet –therapeutic (*not correlative diagnostic/prognostic*)
    - =Intra-articular
    - Facet rhizotomies
  - SI Joint – innervated synovial joint

- **Percutaneous treatments (lasers, needles, wires)**

- **Dorsal Column Stimulators/SCS**
Treatments Strategies: Surgical

Indications

Neural Compression

Spinal Instability

Axial Pain
Surgical Indications

Neural Compression (clinical correlating with radiographs)

- Sensory, reflex, motor findings appropriate:
  - Nerve root (radiculopathy)
  - Spinal Cord (myelopathy)
  - Cauda Equina
  - Neurogenic Claudication
With or without surgery, 80% of patients with sciatica eventually recover. With or without surgery, most patients are at the same point at 1 year.
MRI Views of HNP
Indications for Neural Decompression

- The indication to operate is correlation of the history and exam with the anticipated neural compression confirmed on radiographs
  - Neurologic deficit (strength, reflex)
  - Pain in appropriate distribution so severe, unrelenting despite appropriate management, in motivated patient

- With decompression,
  - Pain usually improves first
  - Weakness improves
  - Numbness/tingling = last to improve, if do
    - Thus, we do not typically operate for numbness/tingling alone

N.B.: "Improves"
Surgical Indications

Spinal Instability

- Congenital
- Acquired
  - Degenerative
  - Traumatic
Spinal Surgery: Spinal Instability

**Degenerative Instability**
- Spondylosis with spondylolisthesis
  - Spondylolysis
  - Facet cysts
- VERIFY Mobility (*flex/ex imaging)

**Fractures/Traumatic Instability**
- Traumatic
  - Guidelines for decompression:
    - Neurologic deterioration,
    - Incomplete neuro deficit,
    - Neuro intact with “significant” compression/angulation (>40% loss height/>50% canal compromise)
- Pathologic
  - Neoplastic
  - Metabolic, incl. osteoporotic
  - Aneurysmal bone cyst
Surgical Indications

Axial Pain

- Controversial
  - Not as an entity
  - As an indication for surgery

\~90\% of patients with low back problems will improve within 6 weeks even without treatment
Spinal Surgery: Treatment Options
SURGICAL Options: Nonfusions

- Laminectomies
- Laminotomies
- Foraminotomies
- Diskectomies (LMD)
SURGICAL Options: Nonfusions

Disk Replacement

- Artificial Disk
SURGICAL Options: **Nonfusions**

- Interspinous Spacer
- Flexible Fusions
SURGICAL Options: Nonfusions

Future Directions

Disk Repair

• Nucleoplasty

■ Annuloplasty
SURGICAL Options: Nonfusions

Kyphoplasty/Vertebroplasty
SURGICAL Options: Fusions

- **Bone on lay**
  - Interlaminar
  - Intertransverse

+/- Instrumentation
SURGICAL Options: Fusions

- Instrumentation
  - Posterior elements
    - Facet
    - Pedicle
    - Spinous process
  - Interbody ALIF, PLIF, TLIF, XLIF
In Short:

- Extremely common problem
- Extremely expensive – cost control
- H&P provide 98% of what you need to know
- Majority of patients will improve with time and inexpensive measures
  - Most patients with back problems do not need imaging
  - Most patients with back problems do not need surgery

*When conservative measures do not provide anticipated benefit, and history, clinical exam, radiology=concordant, these are good surgical candidates*
Thank You
POST TEST QUESTIONS
1. True or False: Lumbar disectomy is an effective treatment for back pain.  
**FALSE**

2. True or False: In a neurologically intact patient with complaints of low back pain and leg pain, in the absence of red flags, it is appropriate to begin conservative measures for 4-6 weeks, reassess, and if no better, then consider ordering imaging.  
**TRUE**
3. A patient presents to clinic with excruciating back pain radiating to her right foot. The patient states the pain goes to her great toe. On physical exam the patient has normal strength throughout except for her Extensor Hallucis Longus which is slightly weak. Her patellar and Achilles reflexes are normal. She has a positive straight leg raise. A MRI reveals a herniated nucleus pulposus. The disc space and nerve root most likely affected are:

a. L3/4 neuroforaminal disk herniation, L3 nerve root  
b. L4/5 neuroforaminal disk herniation, L4 nerve root  
c. L5/S1 neuroforaminal disk herniation, L5 nerve root  
d. L5/S1 neuroforaminal disk herniation, S1 nerve root  
c. **L5 radiculopathy**
4. A 45 year old male comes to your office with complaints of generalized back and neck pain after lifting a couch, helping friends move; he feels like he is getting weaker over past two weeks, and it is the weakness that concerns him most. On examination, you notice his arm reflexes are normal, his leg reflexes are very brisk; his gait is stiff but he has 4/5 strength in hip flexion, 4/5 knee extension, 4-/5 knee flexion, 4-/5 dorsiflexion and 3/5 plantar flexion. He has difficulty relaxing his legs for examination. His sensation is normal in his arms and over his chest, but changes above his umbilicus. Which MRI will you order initially?

a. Brain MRI
b. Cervical MRI
c. Thoracic MRI
d. Lumbar MRI

C. Thoracic MRI

What pathologic process are you most concerned about in this patient?

a. Stroke
b. Radiculopathy
c. Myelopathy
d. Claudication

C. Myelopathy